BC Calculus - Key Topics Covered:

Limits and Continuity

- Limits
    1. informal approach (including one-sided limits)
        a. numerical approach using a graphing calculator
        b. graphical approach using a graphing calculator
        c. algebraic techniques
    2. properties of limits
    3. limits and infinity, asymptotic and end behavior
- Continuity
    1. An intuitive understanding
    2. Definition
    3. Intermediate-Value Theorem

The Derivative

- Average Rate of Change
- The derivative of a function at a point
- The derivative function
- Techniques of differentiation
- The second derivative
- Derivatives of "special" functions
- Chain rule
- Linear approximation
- Implicit differentiation
- Related rate problems

Applying the Derivative

- *L'Hospital's rule*
- Analysis of functions
    1. Critical points, relative and absolute extreme values, increasing/decreasing, first derivative test, inflection points, concavity, and second derivative test.
    2. Relating the graphs of f, f ', and f "
- Mean Value Theorem and Rolle's Theorem

The Definite Integral

- The integral as an accumulation
- Area under a curve
    1. Riemann sums
    2. Trapezoidal Approximation
- The Fundamental Theorem of Calculus (part 1)
- The Fundamental Theorem of Calculus (part 2)
- Antiderivatives and indefinite integrals
- Integration by substitution
- *Integration by parts, partial fractions and improper integrals*

Applications of the Definite Integral

- Area between two curves
- Average value
- Volume of solids
    1. with known cross-sectional area
    2. of revolution – disks/washers
- *Analysis of functions given in polar form and parametric form.*

Differential Equations

- Slope fields
- Separable differential equations
- *Euler's Method*

Infinite Series

- *Geometric series*
- *Testing for convergence and divergence*
- *Taylor series / polynomials*
- *Radius and intervals of convergence of power series*
- *Lagrange and alternating error bound*